P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination

November 2021

SECV3022 Indeterminate Structural Analysis

06.12.2021, Monday **Time: 09:00 a.m. To 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 Define the following: **[05]**

(i) Muller-Breslau principle. **01**

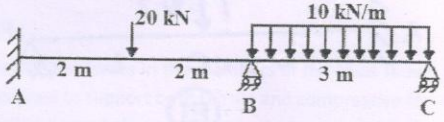
(ii) Influence line diagram. **01**

(iii) Mechanism. **01**

(iv) Indeterminate Structure. **01**

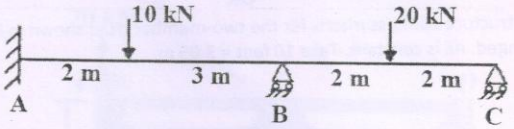
(v) Degree of freedom. **01**

Q – 2 Find fixed end moment for the following continuous beams with support settlement. **[10]**

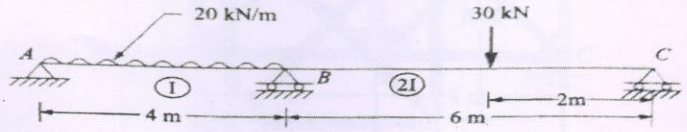


OR

Q - 2 Analyze the beam by slope deflection method and find end moment. **[10]**



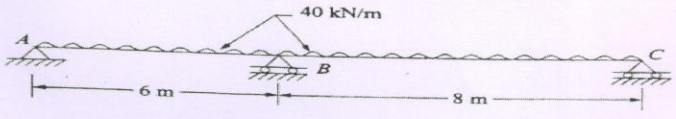
Q – 3(a) Analyze the two span continuous beam shown in Figure 12.4(a) using three moment theorem. **[05]**
In above problem if an udl of 5KN/m and length 3m is moving on the beam which is at left



Q-3 (b) Derive Three Moment equation. **[05]**

OR

Q - 3 (a) Write Equation and draw the bending moment diagram. Flexural rigidity EI is constant throughout. Analyze the continuous beam ABC shown in Figure using three moment equation **[10]**



Q - 4 (a) 2 wheel loads of 10KN and 20KN spaced at 2m apart are moving on a simply supported beam of span 10 m . Find the value of Maximum reaction. [05]

(b) In above problem if an udl of 5KN/m and length 3m is moving on the beam which is at left support then, find the value maximum reaction [05]

SECTION – II

Q - 1 Answer the Following [05]

(i) Define the terms Flexibility and Stiffness. 01

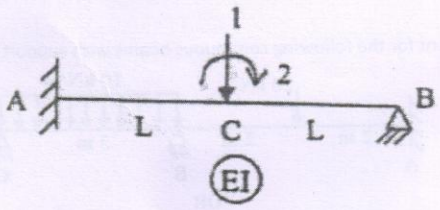
(ii) What do you understand by the terms Determinant and Indeterminant structure? 01

(iii) The stiffness matrix of a beam is given as K= $\begin{pmatrix} 12 & 4 \\ 4 & 5 \end{pmatrix}$. Calculate the flexibility matrix. 02

(iv) Explain where practically internal hinges are encountered. 01

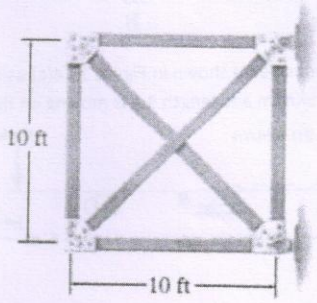
Q - 2 (a) Distinguish the difference between Flexibility method and Stiffness method. [05]

Q - 2 (b) Determine the stiffness matrices for the beam shown in the figure. [05]

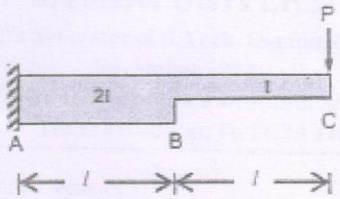


OR

Q - 2 Determine the structure stiffness matrix for the two-member truss shown in Figure, assume all the joints are hinged. AE is constant. Take 10 feet = 3.05 m. [10]

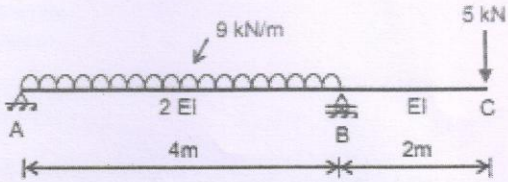


Q - 3 Determine the deflection at the free end of the cantilever beam shown in Figure By using Flexibility method. [10]

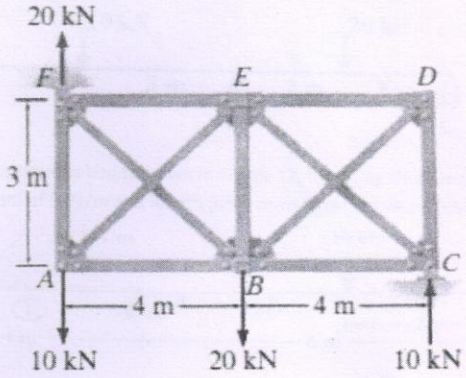


OR

Q - 3 Find the deflection at joint C of the beam shown in Figure by using flexibility method. **[10]**



Q - 4 Determine (approximately) the forces in the members of the truss shown in Figure. Assume The diagonals are to be designed to support both tensile and compressive forces, and therefore each is assumed to carry half the panel shear. The computed support reactions at joints C and F are found to be 10 kN and 20 kN respectively. **[05]**



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